Electronic Supplementary Material (ESI) for ChemComm.

Reversible assembly of silver nanoparticles driven by host–guest interactions based on water-soluble pillar[*n*]arenes

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Electronic Supplementary Information (6 pages)

1. Materials and methods

The water-soluble pillar[5]arene **WP5**, water-soluble pillar[6]arene **WP6**, ang guest molecules **G** were prepared according to the method previously reported.[S1, S2, S3] The TEM images were obtained using a JEM-1200EX instrument with an accelerating voltage of 80 kV. UV−Vis spectroscopy was measured on a Shimadzu UV-2501 PC UV−Vis spectrometer. The fluorescence titration experiments were conducted on a RF-5301 spectrofluorophotometer (Shimadzu Corporation, Japan).

*2. Synthesis of **WP5**-stabilized silver nanoparticles*

WP5-stabilized silver nanoparticles were synthesized by the reduction of $AgNO_3$ in the presence of **WP5**. In a typical synthesis, $AgNO_3$ (20.0 μL, 10.0 mM) was added to deionized water (20.0 mL), followed by the addition of an aqueous solution of **WP5** (1.00 mL, 0.100 mM). $NaBH_4$ (20.0 μL, 0.100 M) was freshly prepared with deionized ice water and added to the above reaction mixture while stirring. The solution immediately turned yellow and **WP5**-stabilized silver nanoparticles were thus obtained. This concentration of **WP5**-stabilized silver nanoparticles was used in all experiments unless otherwise noted.

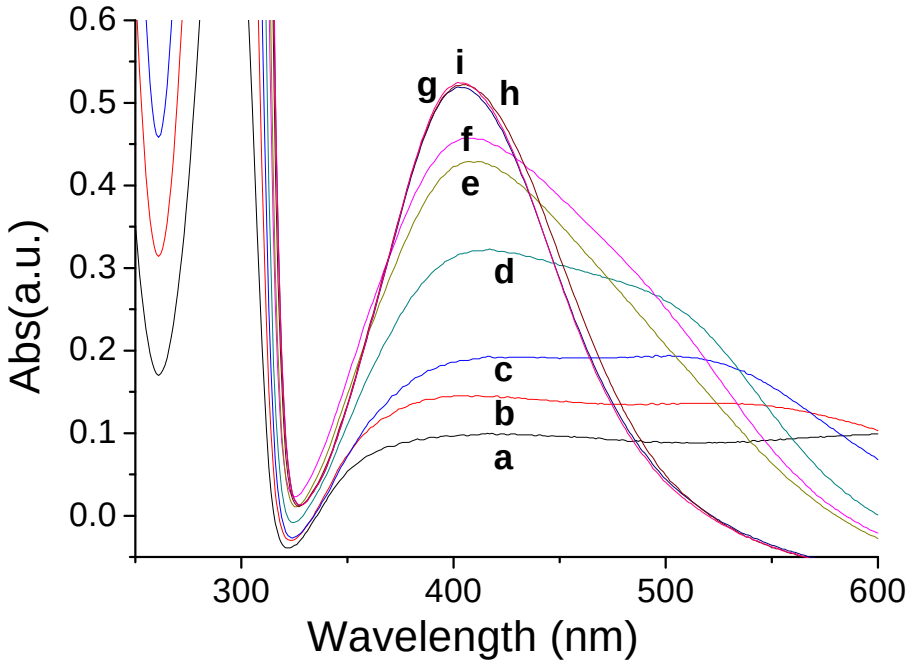

Fig. S1. UV−Vis spectra of silver nanoparticles with different concentrations of **WP5** as stabilizer: (a) 2.00×10^{-5} M; (b) 5.00×10^{-5} M; (c) 1.00×10^{-4} M; (d) 1.50×10^{-4} M; (e) 2.00×10^{-4} M; (f) 3.00×10^{-4} M; (g) 4.00×10^{-4} M; (h) 6.00×10^{-4} M; (i) 8.00×10^{-4} M.

3. *Assembly of **WP5**-stabilized AgNPs by addition of **G**.*

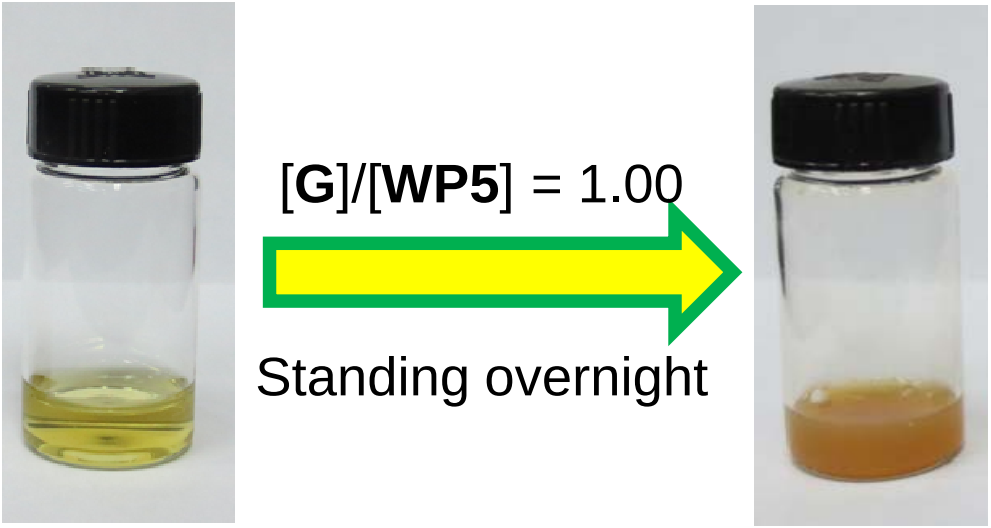

Fig. S2. Optical pictures of **WP5**-stabilized silver nanoparticles and after addition of **G**. [**G**]/[**WP5**] = 1.00.

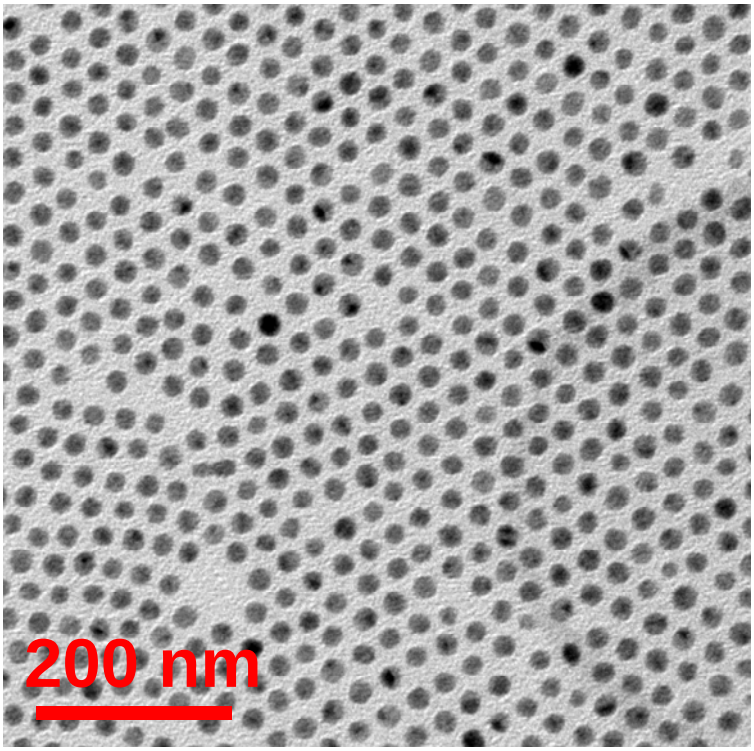

Fig. S3. TEM image of **WP5**-stabilized silver nanoparticles without **G**.

4. *Disassembly of silver assemblies by addition of* ***WP6***.

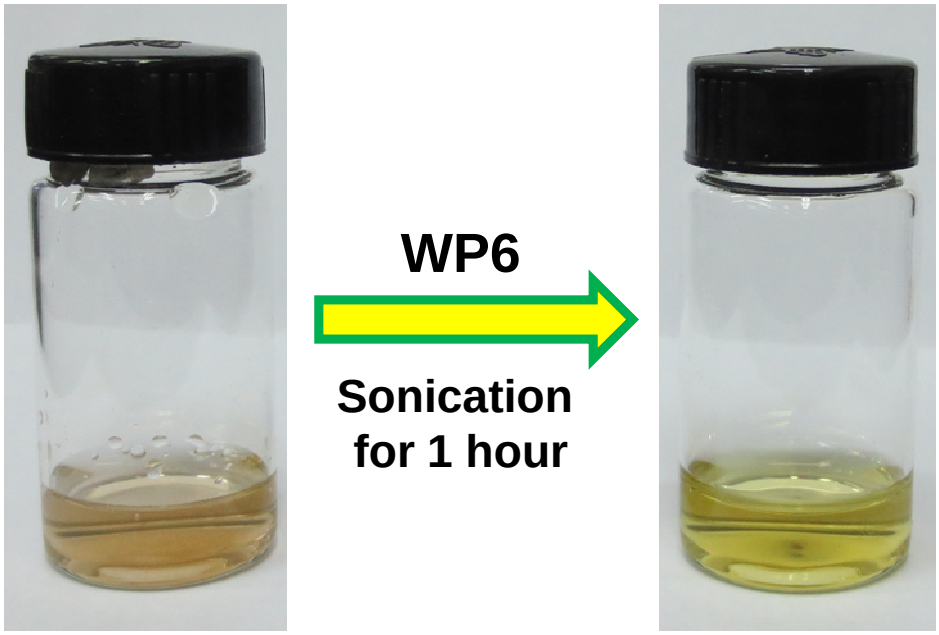

Fig. S4. Optical pictures of silver assemblies and after addition of excess **WP6**.

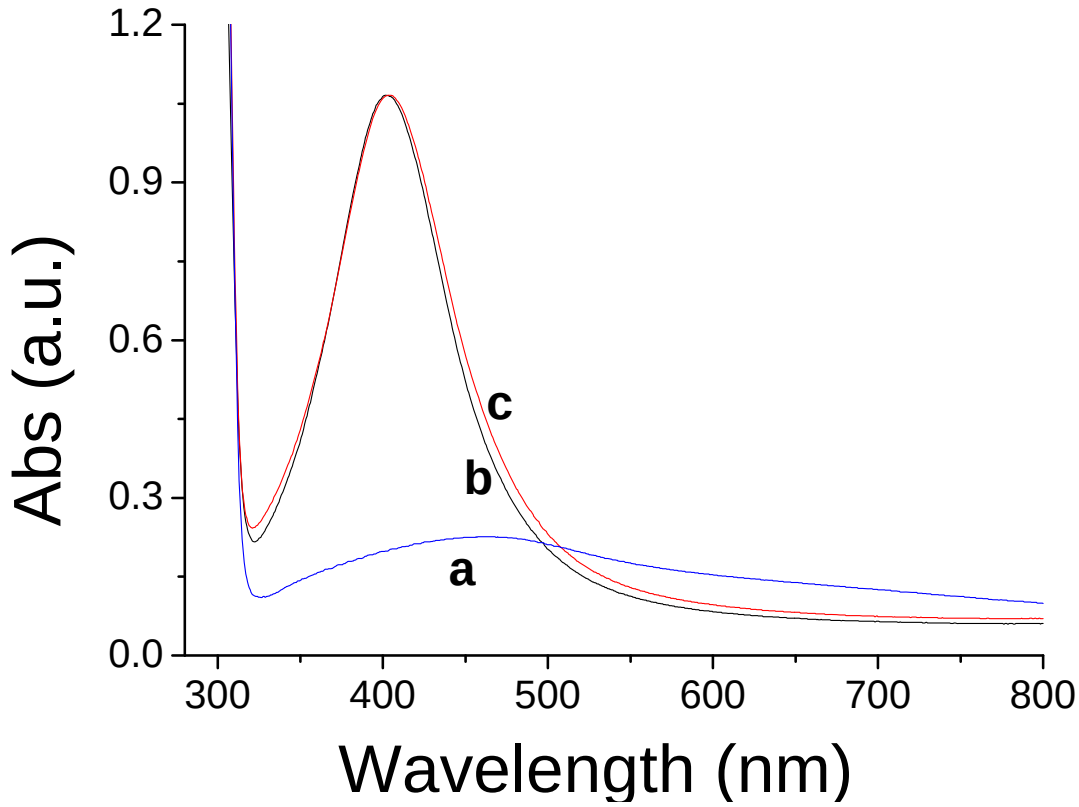

Fig. S5. UV−Vis spectra: (a) silver assemblies; (b) addition of excess **WP6** and sonication for 1 hour; (c) addition of excess **WP6** and sonication for 8 hour.

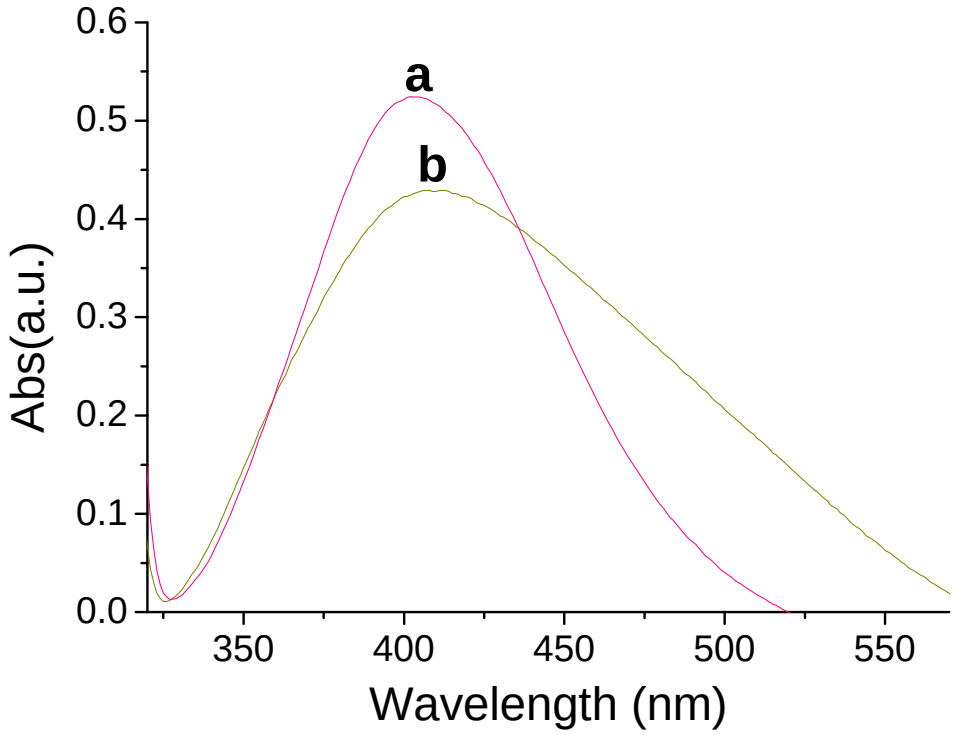

Fig. S6. UV−Vis spectra of silver nanoparticles: (a) after addition of excess **WP6** and sonication for 1 hour; (b) after centrifugation and subsequent immediate redispersion in water.

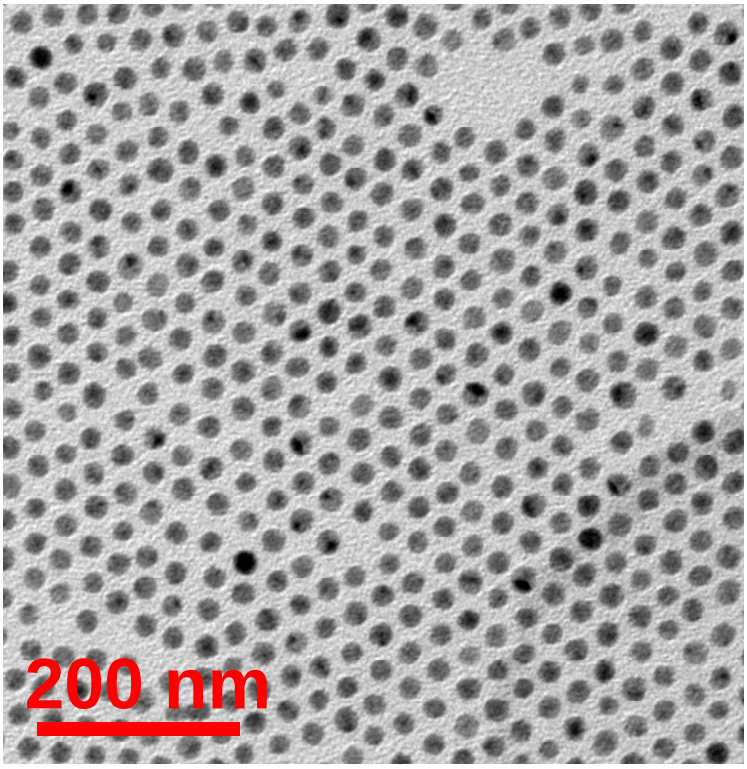

Fig. S7. TEM image of the redispersed **WP5** stabilized silver nanoparticles.

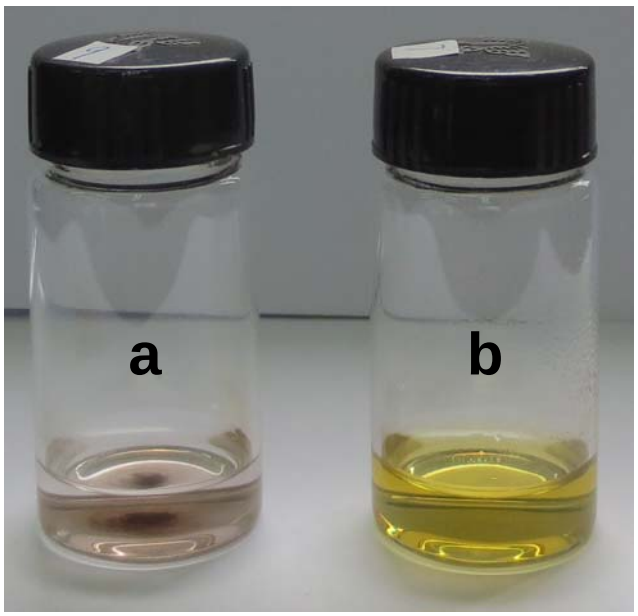

Fig. S8. Optical pictures: (a) silver assemble solution when [**G**]/[**WP5**] was as high as 10.0; (b) after addition of excess **WP6** and sonication for 1 hour.

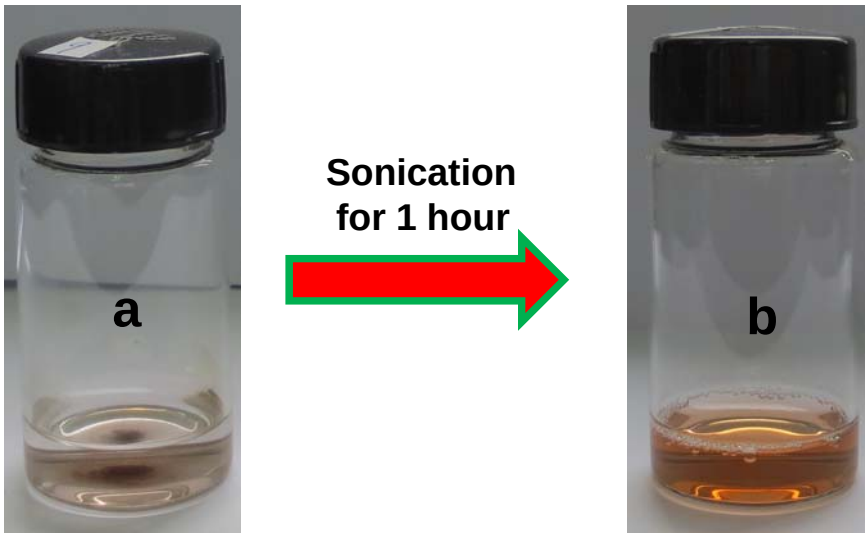

Fig. S9. Optical pictures: (a) silver assemble solution when [**G**]/[**WP5**] was as high as 10.0; (b) after sonication for 1 hour.

5. References:

S1. (a) T. Ogoshi, M. Hashizume, T. Yamagishi and Y. Nakamoto, *Chem. Commun.*, 2010, **46**, 3708; (b) Y. Yao, Y. Zhou, J. Dai, S. Yue and M. Xue, *Chem. Commun.*, 2014, **50**, 869.

S2. G. Yu, M. Xue, Z. Zhang, J. Li, C. Han and F. Huang, *J. Am. Chem. Soc.*, 2012, **134**, 13248

S3. H. Li, D.-X. Chen, Y.-L. Sun, Y. B. Zheng, L.-L. Tan, P. S. Weiss and Y.-W. Yang, *J. Am. Chem. Soc.*, 2013, **135**, 1570.